11/ Declaration
4-14-03
J Bell

MSDSPD.0005P

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	:	Jones, et al.	Group Art Unit: 2857
Appl. No.	:	09/810,932	
Filed	:	March 16, 2001	
For	:	**METHOD AND APPARATUS FOR TRANSMISSION LINE ANALYSIS**	
Examiner	:	Jeffrey R. West	

we hereby certify that this correspondence and all marked attachments are being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231, on

March 25, 2003
(Date)

C. Miller

Chad W. Miller, Reg. No. 44,943

JOINT DECLARATION BY INVENTORS KEITH JONES AND WILLIAM JONES

Assistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

We, Keith Jones and William Jones, declare as follows:

1. I, Keith Jones, am an inventor of the subject matter of the above-referenced application. My qualifications and experience in this field of art include an MSEE in Radar and Communications and a MS in VLSI design, twenty years' experience in both engineering design and teaching at an accredited graduate engineering school, and I am currently a distinguished engineer with Mindspeed Technologies.
2. I, William Jones, am an inventor of the subject matter of the above-referenced application. My qualifications and experience in this field of art include a Ph.D.E.E. in Communications and Digital Signal Processing, with 17 years' experience developing

communication systems for satellite, wireless and wireline applications, and I am currently Director of Systems Engineering with SolarFlare Communications, Inc.

3. One problem to which we and others in our field of technology have continuously sought a solution is an efficient manner of locating line anomalies. We and others in the field are aware of the numerous challenges associated with locating line anomalies utilizing test equipment.

4. One path of prior art test procedures focused on utilizing pulse technology to perform TDR by generating a pulse test signal that was sent over the line. Use of pulse technology is not complex and may be implemented with minimal processing requirements.

5. Pulse technology testing suffered from the drawbacks of creating interference with other adjacent lines, having limited resolution, and limited distance capability. Thus, it is often unsuitable for modern applications.

6. Another path of test procedures focused on utilizing stand alone test equipment to perform TDR using complex sequence signal generation, transmission, and processing.

7. Existing stand alone test equipment for performing TDR suffers from the drawback of requiring a technician to physically connect the test equipment to a line and independently conduct a test of each line. This requires additional time and cost to test a line due to the training and employ of the technician.

8. It is also our understanding that existing stand-alone test equipment for performing TDR can range in price from $300 to $700. In addition, a testhead that can be integrated into central office equipment capable of testing 1-2 thousand ports via relays typically

costs around $7000. Due to the cost, complexity, size, power consumption, and heat generation, it is our opinion that it is understood by those of ordinary skill in the art that complex sequence signal TDR can not be combined into a communication device. Hence, it has been relegated to stand alone test equipment or expensive test heads.

9. Thus, the two paths, pulse technology TDR and complex sequence signal TDR in stand alone test equipment, are the two paths that have conventionally been followed in the art. It is our opinion that these two paths represent the accepted and conventional wisdom in testing communication lines.

10. As is understood by one of ordinary skill in the art, the accepted and conventional wisdom is to minimize complex tasks assigned to devices that are mass produced, and the processing of sequence signal TDR and convolution is a complex task.

11. In contrast to this accepted and conventional wisdom, we have included sequence signal TDR with convolution on a communication device. It is our opinion that our invention goes against accepted and conventional wisdom. As discussed below in conjunction with the prior art, it is our opinion of the prior art that the references will lead readers of the prior art down either of these conventional prior art paths and away from our invention.

12. It is our opinion that our invention goes against accepted and conventional wisdom by combining complex sequence signal TDR into a communication device.

13. Part of what we believed was the inventive aspect of our system was our revelation and discovery to combine time domain reflectometry utilizing sequence signals and correlation processing into a communication device, such as for example, a modem.

Thus the line test functionality can be included with every modem, either at the CPE or the CO or both, or at any location.

14. The effect of having sequence signal TDR with correlation in every modem would eliminate the need in most all situations for stand alone test equipment and provide unprecedented flexibility and speed in testing a line during establishment of the communication service.

15. When we presented this idea to others as part of the development process, it was met with skepticism because it was believed that it could not be done and that such complex processing would not be suited to a communication device or would not be possible with communication device hardware as claimed. The amplitude of a traditional TDR signal exceeds the dynamic range of the modem analog frontend. In addition, the marketability of a modem ASIC is very sensitive to pricing; thus, incorporating additional circuit elements to perform the TDR function is not desired. One aspect of our invention is that fact that it can be implemented in a communication device without adding additional circuit elements to the communication device.

16. One important aspect of our inventive process was that we could utilize or modify existing communication system hardware to generate the sequence signals and analyze the reflected sequence signals. Absent this discovery, prior art communication devices were unable to generate and process the time domain reflectometry signals utilizing prior art processes. The method and apparatus claimed as part of our communication devices configured to perform sequence signal TDR with correlation can be enabled

utilizing systems and hardware as found in modern communication devices. This goes against the accepted and conventional wisdom in the art.

17. Based on our knowledge of the prior art and our interpretation, we do not believe that the patents cited below suggest that we should or even could combine sequence signal TDR with convolution in a communication device.

18. We have reviewed U.S. Patent Application publication number US 2002/0114383 (the Belge reference) that was cited by the Examiner. In our opinion, much of this reference deals with training of filters in a communication device and hence, is not relevant to our invention.

19. The Belge reference does discuss time domain reflectometry (TDR) at paragraph 76. The form of TDR in the Belge reference does not utilize sequence signals, but instead utilizes signals defined by the equation in paragraph 74. The Belge reference does not discuss or suggest correlation.

20. We interpret paragraph 76 as discouraging us from implementing the TDR as claimed in our patent application because paragraph 76 expressly states that analyzing the time domain waveform of the echo signal becomes very complicated, and for this reason this reference is forced to rely on a model based approach for TDR estimations. Hence, it is our opinion that the Belge reference leads down the path of utilizing pulse TDR type testing and non-correlation type processing and in fact suggests that other type testing would be too complex for inclusion in a modem in paragraph 76. Our claimed system of sequence signal reflection correlation is much more complicated

and accurate than a model system and was enabled by our discovery to adapt existing modem systems to our claimed method of TDR.

21. A model based approach as outlined in the Belge reference does not utilize a sequence signal or correlation and, in our opinion, is far inferior to our claimed system due to inaccuracies and the fact that it suffers from the drawbacks discussed above for pulse type TDR systems.

22. We have reviewed U.S. Patent Number 5,600,248 (the Westrom reference). In our opinion, this reference is not in the same field of technology or art as the subject matter of our invention. As specified in the background and throughout the specification, the Westrom reference deals with test equipment for high voltage transmission lines. Because this reference is not in our field of technology, we would not rely on this reference. We in the communication field generally do not look to references in the high voltage power transmission field for information because the two fields and the technologies are unrelated. For example, high power transmission lines are substantially different in configuration, location, and use than high speed communication lines, and hence, the technologies are incompatible.

23. Even if we looked at or utilized the Westrom reference, as the Examiner suggests, the Westrom reference discourages us from performing TDR in the method and system as claimed because it teaches use of high power pulse, see Figure 1, element 28, to generate a high power pulse. This reference thus teaches us that we should go down the previously discussed prior art path of pulse technology for TDR. Use of a high

power pulse is exactly opposite in theory from our sequence signal correlation theory, which utilizes a low power signal.

24. We have reviewed U.S. Patent Number 4,597,183 (the Broding reference). In our opinion, this reference is not in the same field of technology or art as the subject matter of our invention. As specified in the background and throughout the specification, the Broding reference deals with well drilling. Because this reference is not in our field of technology, we would not rely on this reference. We in the communication field generally do not look to references in the well drilling field for information because the two fields and the technologies are entirely unrelated.

25. We have reviewed U.S. Patent Number 4,041,381 (the Hwa reference). We interpret this reference as being directed to or suggesting that we follow the prior art path of stand alone test equipment (Figure 3) for use in testing a line.

26. Based on our reading of the Hwa reference, it suggests a complex system, shown in Figure 1, for a stand alone system for testing transmission lines. Column 1, lines 6-7. At no point in our review of the Hwa reference were we motivated to combined the system of Hwa with a communication device as we are claiming in our patent application.

27. We have reviewed U.S. Patent Number 6,298,118 (the Liggett reference). We interpret this reference as being directed to a piece of hand held test equipment (Figure 3) for use in testing a line.

28. We do not interpret the Liggett reference as suggesting that we should combine its TDR teachings with a modem or communication device as we have claimed in our application. The Liggett reference is limited to stand alone test equipment (Figure 4).

29. We believe, as individuals of at least ordinary skill in the art, that the Liggett reference teaches us to follow one of the conventional prior art paths, i.e., to utilize complex processing in a stand alone piece of test equipment. The Liggett reference leads us away from the combination of a TDR system using sequence signal correlation with a communication device because it teaches that we should use a processor, such as main processor 14 or pseudo-random code processor 24, to generate a sequence signal. This is in contrast to the claimed invention because the claimed invention utilizes existing communication device hardware, not additional processors. As we mentioned above, suggestions to utilize one or more processors to do sequence signal TDR, i.e., basic prior art sequence signal TDR, does not motivate us to utilize existing modem hardware, such as for example a scrambler, to perform sequence signal generation.

Appl. No. : 09/810,932
Filed : March 16, 2001

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful, false statements and like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful, false statements may jeopardize the validity of the application or patent issuing therefrom.

Keith Jones 3/20/03 Date

William Jones 3/20/03 Date